THE WEATHER ELEMENTS.

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PRESSURE AND WINDS.

By midsummer the atmospheric circulation has usually been reduced to the minimum of activity for the year, and cyclones and anticyclones are of the weakest type, though still of sufficient energy to cause material changes in wind movement with corresponding variations in temperature and other important weather conditions.

July, 1923, was mainly without important changes from normal pressure conditions, and while high and low areas were not of material importance they were sufficiently frequent to afford agreeable changes in temperature, as well as to regulate in a generally satisfactory manner the distribution of rainy and fair weather.

Low-pressure areas were frequent during the first half of the month, particularly in the western mountain districts and over many of the Central and Eastern States, but they were usually of slight intensity and only occasionally did they pursue well-defined paths over material distances. They were favorable to the development of local thunderstorms and these were of frequent occurrence from the Rocky Mountains eastward, save over the southern plains and adjacent regions, and locally in the middle Mississippi Valley and portions of the Northeastern States.

From about the 15th to 23d there was comparative freedom from conditions favoring thunderstorm activity over the central valleys and northern districts, and this was mainly the driest portion of the month over those regions.

From the 27th to 29th a low-pressure area, moving from the central Mississippi Valley eastward to the Atlantic coast, was attended by much needed and copious showers, greatly relieving droughty conditions which had become serious in some of the Middle Atlantic States.

For the month as a whole the average pressures were mainly near the normal, save from the Great Lakes eastward and over the Canadian Maritime Provinces, where they were materially above.

The pressure averages as compared with the preceding month were higher in all parts of both the United States and Canada. This is somewhat unusual, particularly over the eastern districts of Canada and the northeast portions of the United States, where the pressure in July is, as a rule, less than in June, whereas in July, 1923, the averages were far above those for June. Similar conditions prevailed on the Pacific coast, but to a less extent.

Due to the absence of important variations in pressure, winds of injurious velocities were associated almost entirely with thunderstorms. These were numerous, as stated elsewhere, but they were only occasionally accompanied by damaging windstorms, the main features of which appear in the table at the end of this section.

The prevailing winds for the month were principally from southerly points over the Great Plains and from the lower Mississippi Valley eastward; elsewhere they were highly variable.

TEMPERATURE.

Change in temperature from day to day were small, amounting rarely to more than 10° in 24 hours, although there were well recognized warm and cool periods during the month, but these were mainly brought about by continued small daily changes in one direction.

The first few days of the month were cool over the districts to eastward of the Rocky Mountains, particularly in portions of the Gulf States where the minimum temperatures on the morning of the 1st were in some cases nearly as low as ever observed in July. In the far West this period was generally warmer than normal. By the 4th temperatures had returned to near the normal in nearly all districts.

The week ending the 10th had mainly moderate temperatures, the averages being from 2 to 6° above normal over most parts of the central valleys and generally slightly below over the remaining districts.

The week following the 10th was warm over all interior portions of the country, the weekly averages exceeding the normal from 3 to 6° over the Great Plains and far Northwest. In the far Southwest, however, the week was cooler than normal and similar conditions existed, though to a less degree, from the upper Lakes to northern New England and over portions of Georgia and Florida.

The week ending July 24 was warm over the northern two-thirds of the country, the averages for the period ranging up to 9° above normal, with the greatest excesses over the northern districts between the Great Lakes and the Rocky Mountains. At the same time cool weather dominated the southern districts, particularly on the morning of the 20th, when in portions of the Middle Gulf States the temperatures established new low records for July.

The last week of the month had generally high temperatures over the western half and moderately low temperatures for a midsummer month over the eastern half of the country. In the Southern Plains the week was decidedly warm, particularly during the first half, while in New England that portion of the week was distinctly cool.

The more important heated periods were at the beginning of the month in the far Southwest; near the beginning of the second decade from the Lake region southward to the Gulf States; about the 20th to 24th over the Eastern States, Great Plains, and middle Mississippi Valley; and over much of the southern plains and the far West near the end. Maximum temperatures of 100° were reported from nearly all States, reaching extremes of 111° in Kansas and Oklahoma, 114° in Texas, 116° in Arizona and Nevada, and 123° in the depressed valleys of California.

The principal cool periods were on the 1st from the Rocky Mountains eastward, continuing over the 2d in a few sections, on the 20th at points in the Middle Gulf States, and on scattered dates for other portions of the country. Freezing temperatures were reported from exposed points from Pennsylvania to New England and at high elevations in most of the Western Mountain States.

The month as a whole was warmer than normal from Texas northeastward to the lower Lakes and thence westward to the Pacific coast, except for portions of Arizona and southern California, where it was slightly cooler. The month was among the warmest of record for July over portions of the upper Missouri Valley and adjacent areas, and also along the coast of northern California. Over the more eastern portions of the country the month was cooler than normal, particularly over the northern portions of New York and New England, where locally it was the coolest July of record, and it was an unusually cool month in portions of the Middle Gulf States.

PRECIPITATION.

Over the greater part of the country where liberal precipitation usually occurs during the midsummer month, the falls were, on the whole, deficient as compared with the normal. This was particularly the case from Texas and near-by localities northeastward over Oklahoma, Kansas, Missouri, Iowa, and to Lake Michigan, and from the lower Lakes to northern New England. In the Gulf States and thence northeastward to southern New England there was much diversity in the monthly amounts, some localities having generous showers at favorable intervals, while near-by areas suffered from serious shortages. Over the middle and northern Rocky Mountain regions and thence westward, where precipitation is generally insufficient for best crop growth, the falls were frequent and nearly everywhere above normal. This was particularly the case from Colorado northward into the western Canadian Provinces, where precipitation was unusually heavy for the period of the year and in some localities, notably in Wyoming, the month was the wettest of record for July.

In portions of Kansas and generally over Oklahoma and the greater part of Texas, including portions of adjacent States, the precipitation for the month was far less than the normal requirements, and serious need of rain existed at the close, the droughty conditions being augmented by a general lack of sufficient moisture during the latter part of June over the same area and by the high temperature during much of July.

The more or less serious need of rain, being felt in June over many Atlantic coast districts was mainly overcome at various periods during the month, so that by the end no important areas over the eastern portions of the country were seriously in need of rain, save locally in the Middle Atlantic States, principally in northern New York, eastern Pennsylvania, and portions of New Jersey.

In the far Southwest, where the July precipitation is usually the maximum for the year, the falls were timely and mainly more than normally received.

SNOWFALL.

In California snow covered some of the highest peaks of the Sierra Nevada on several dates, an unusual phenomena during the midsummer. In other mountain districts not more than traces of snow were reported.

The supply of water for irrigation, hydroelectric power, etc., appears to have been adequate in the western districts where storage is necessary.

RELATIVE HUMIDITY.

The extremely dry and hot weather prevailing during much of the month over Oklahoma and to the southward moderately influenced the percentage of relative humidity, which ranged up to an extreme of 14 per cent below the normal. The more or less droughty conditions in the middle Mississippi Valley and thence to the Great Lakes and portions of the Northeastern States were associated mainly with deficient relative humidity. In the districts from the middle and northern Great Plains westward to the Pacific the relative humidity was nearly everywhere above normal, due to the general frequency of cloudy, rainy weather. Elsewhere humidity conditions were mainly near the normal.

SEVERE LOCAL STORMS, JULY, 1923.

[The table herewith contains such data as have been received concerning severe local storms that occured during the month. A more complete statement will appear in the Annual Report of the Chief of Bureau.]

Place.	Date.	Time.	Width of path (yards).	Loss of life.	Value of property destroyed.	Character of storms.	Remarks.	Authority.
Westchester Co., N. Y.	4					Hail	Large amount of damage to crops	Official, U. S. Weather Bureau.
Pittsburgh, Pa.	6	P. m.		1		Electrical and wind.	Buildings and wires damaged	Do.
Northeast and east central Iowa.	7					Wind and hail	Growing crops severely damaged	Do.
North Dakota (southeast portion of).	8					Wind, rain, and hail	Heavy damage reported	Do.
Pittsburgh, Pa., and vicinity.	10					Electrical and wind.	Electric light and power lines blown down and sign boards damaged.	Chicago (Ill.) Daily News. Official, U. S. Weather Bureau.
Ringling, Mont. (vicinity of).	10					Tornado	House and barn wrecked	Do.
Western Iowa	10				$200,000	Wind and hail	Heavy crop loss	Do.
Detroit, Mich.	10					Electrical, wind, and hail.	Considerable damage by lightning and floods.	Do.
Sanders Range, Md.	11			3		Electrical	Tent destroyed and 14 persons injured	Do.
Clinton Co., Ind. (western part of).	11					Wind, rain, and hail.	Growing crops badly damaged	Do.
Decatur, Ill. (vicinity of)	11			1		Thunderstorm	Considerable minor damage; two barns destroyed by lightning.	Do.
Oak Hill, Ill. (vicinity of)	11				10,000	do	General damage reported	Do.
Granite, Okla.	12			2		Tornado	Considerable property loss	Dallas (Tex.) Morning News.
Dayville, Oreg. (vicinity of).	13					Heavy rains	Much damage to crops; some loss of live stock	Official, U. S. Weather Bureau.
Wichita, Kans. (vicinity of).	14	P. m.		1		Wind, rain, and hail.	Farm houses damaged, barns blown down, crops destroyed, and other minor damage.	Wichita (Kans.) Beacon.
Green Bay, Wis., and vicinity.	14	...do				Wind and rain	Several persons injured; houses and orchards damaged.	Official, U. S. Weather Bureau. Green Bay (Wis.) Press Gazette.
Dayville, Oreg. (vicinity of).	15					Heavy rains	Crops considerably damaged; some live stock killed.	Official, U. S. Weather Bureau.
Gallatin Valley, Mont. (near Willow Creek).	16	P. m.				Wind, rain, and hail.	Extensive damage to homes, crops, and communication lines.	Post (Denver, Colo.).
Liberty, Ariz. (near)	22	...do			2,000–3,000	Thunderstorm	Highways damaged and small buildings and poles blown down; minor railway washouts.	Official, U. S. Weather Bureau.
Essex Co., N. J.	22	...do		2		Electrical and wind.	Poles blown down and traffic interfered with; many persons injured.	Herald (New York).
Tullahoma, Tenn.	22					Wind and rain	General damage reported	Official, U. S. Weather Bureau.
Knoxville, Tenn.	22				25,000	Thunderstorm	Trees and poles blown down; plate glass windows broken.	Do.
Las Vegas, N. Mex.	23					Wind and floods	Considerable damage	Do.
Glendale, Ariz., and vicinity.	29	P. m.			5,000	Wind and rain	Several buildings destroyed and others damaged; other minor damage.	Do.
Parts of Jasper, Newton, McDonald, and Barry Counties, Mo.	29	...do			300,000	Wind, rain, and hail.	Heavy damage, principally to crops	Do.